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ABSTRACT

The effect of immediate knowledge of results on test performance was investigated. Three groups of college and high school students used IBM card punchboards to receive immediate feedback after each item of one-half of the items on multiple-choice tests and delayed feedback on the remainder. Two-way analysis of variance was used to test for significant differences in the results under the two conditions on each of ten one-hour examinations and on one final examination. There were no statistically significant differences in means under immediate and under delayed knowledge of results on any one of the one-hour examinations. The difference in results on the final examination, however, was significant beyond the .05 level in favor of immediate knowledge. Immediate item-by-item knowledge of results thus did not depress test performance. The findings appear to justify the recommendation that teachers make greater use of testing devices which give students immediate item-by-item knowledge of test results. (Author/LR)

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IMMEDIATE KNOWLEDGE OF RESULTS AND TEST PERFORMANCE

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IMMEDIATE KNOWLEDGE OF RESULTS AND TEST PERFORMANCE

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The necessity for change in conventional testing techniques is supported by research (Angell and Troyer, 1948; Pressey, 1926, 1950; Willey, 1967). One possible change incorporates a most important aspect of programmed learning or self-instructional devices: immediate knowledge of results. The importance of immediate knowledge of results as a means for more efficient learning also is supported by research (Angell, 1949; Little, 1934; Willey, 1958), but it is not known whether immediate knowledge of results generally depresses or increases scores when students are given immediate knowledge of their performance after each test item. Virtually no attention has been paid to this potentially useful testing technique.

The purpose of this study was to investigate the possible effect of immediate knowledge of results on test performance when the student is given immediate knowledge of results after each item. Also, an effort was made to determine the relationships between test performance and certain intra-personal characteristics.

Method

The samples used in this study consisted of three groups of mathematics students: Group I consisted of 30 students

enrolled in a university class in mathematics for elementary school teachers; Group II consisted of 15 students enrolled in a university class in remedial mathematics; and Group III consisted of 30 students enrolled in a junior high school class in general mathematics. Students were randomly assigned to either one of two subgroups in their respective group. Once a student was assigned to a subgroup, he remained with that subgroup throughout the experiment. One subgroup in each group received knowledge of results (KR) on either the first or second half of the items on the test. The other subgroup in each group received the opposite condition. Each subgroup had delayed knowledge of results (DKR) on the other half of the test items. No subgroup received KR on the same half of test items on any two consecutive tests. Care was taken to assure that KR on an item in one part of a test did not cue the answer to an item elsewhere in the test.

Group I used the punchboard as a self-instructional as well as a testing device. They were given brief orientation and practice in the use of the punchboard prior to each one-hour examination. There were four one-hour examinations and four practice tests. The latter did not count toward the students' final grades. The conditions with respect to KR and DKR were the same for the practice as for the one-hour tests. Group I also used the punchboard on their final examination.

Groups II and III were each given brief orientation and practice sessions in the manipulation of the punchboard. They used the punchboard on each of three one-hour examinations.

Scores were recorded for each student on each half of the test for the respective condition under which that part of the test was administered. The score for the KR condition was the total number of correct responses in one attempt. The score for the DKR condition was the total number of correct responses on that half of the test.

Various instruments were administered to obtain measures for each student on the following intra-personal characteristics: achievement motivation, test anxiety, aspiration, and attitude.

Results

The means and standard deviations for KR and DKR for each group are shown in Table 1. Two-way analysis of variance was used to determine the effect of KR on student test performance in each group. The .05 level of significance was used. The statistical model was the mixed model, with rows being individuals and columns being treatments (testing conditions). Because this was a mixed model with n = 1, no meaningful test for row effects was possible. The results of the two-way analysis of variance for KR and DKR for each examination for each group are shown in Table 2.

One can observe from Table 2 that there were no statistically significant differences in the performance of the students when given KR and when given DKR on any one of the ten one-hour examinations. The difference in the results of the two testing methods on the one final examination, however, was significant beyond the .05 level in favor of KR.

Coefficients of correlation between student test performance and the intra-personal variables and multiple linear regression models for prediction of student test performance from a knowledge of these intra-personal characteristics were used to determine the significance of any existing relationships. In general, no significant relationships were found.

TABLE 1

Means and Standard Deviations

for KR and DKR

		Group					
		I		II		III	
Exam	Variable	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
1	KR	14.53	2.47	8.27	1.33	12.83	3.75
	DKR	14.00	2.89	7.67	1.78	11.67	3.82
2	KR	15.83	2.52	7.60	2.16	12.83	4.32
	DKR	16.10	3.36	7.00	1.77	11.40	4.44
3	KR	12.73	3.63	6.47	2.31	10.23	3.92
	DKR	12.80	3.17	6.07	3.21	10.63	4.14
4	KR	13.43	3.75				
	DKR	12.63	4.07				
Final	KR	28.97	6.08				
	DKR	27.27	6.38				

TABLE 2

Analysis of Variance

for KR and DKR

Group	Exam	Source	df	MS	F
I	1	Columns	1	4.27	2.140
		Residual	29	1.99	
	2	Columns	1	1.07	0.346
		Residual	29	3.07	
	3	Columns	1	.07	0.011
		Residual	29	4.51	
	4	Columns	1	9.60	1.100
		Residual	29	8.24	
	Final	Columns	1	43.35	4.620 *
		Residual	29	9.38	
II	1	Columns	1	2.70	1.465
		Residual	14	1.84	
	2	Columns	1	2.70	0.950
		Residual	14	2.84	
	3	Columns	1	1.20	0.272
		Residual	14	4.41	
III	1	Columns	1	20.42	3.402
		Residual	29	6.00	
	2	Columns	1	30.82	3.388
		Residual	29	9.09	
	3	Columns	1	2.40	0.208
		Residual	29	11.54	

Discussion

From the statistical analyses of the data, it was concluded that in general, there were no significant differences in the results of the two methods of testing, KR and DKR.

Although the F ratios for the one-hour examinations did not reach significance at the .05 level, there were some differences worthy of mention. An investigation of Table 1 reveals that the over-all performance was slightly higher when students were given KR. The difference in results in the analysis of variance for the one-hour examinations and the final examination bears further comment. It is important to note that student performance was not lessened by KR; rather, it was improved generally by being given KR, even on the one-hour examinations. Perhaps the increased length of the final examination over each of the one-hour examinations accounts for the fact that the F reached the .05 level of significance. This suggests that significant differences might have resulted on the one-hour examinations if they had been longer, more reliable examinations. This thesis finds added support in the fact that students tended to perform better when they were given immediate knowledge of results.

The intra-personal variables found to contribute most to prediction of test performance were test anxiety and attitude.

The findings of this investigation appear to justify recommending that classroom teachers of mathematics make greater use of testing devices which give students immediate knowledge of results item-by-item.

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